

Citrus leprosis poses a threat to Florida

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Citrus leprosis is an exotic viral disease not currently present in Florida. This disease is of interest since it was reported in citrus in Florida and Brazil in the early 1900s, where it caused great crop and tree losses, but it was eliminated from Florida in the early 1960s.

Currently, the disease is widespread in South and Central America, including Mexico, and is transmitted by false spider mites that are present in Florida. The combination of the existence of the disease vectors in Florida and the presence of the virus in nearby production areas makes it a potential threat to the Florida citrus industry.

ABOUT THE DISEASE

Citrus leprosis is a non-systemic viral disease that causes chlorotic lesions on citrus leaves, fruit and twigs in response to feeding (and virus transmission) by infected mites. The virus is mainly transmitted by several species of *Brevipalpus* false spider mites (*B. phoenicis*, *B. californicus*, *B. obovatus* and *B. yothersi*), including those found in Florida.

False spider mites have a wide host range, enabling them to persist in many environments. In the absence of the virus, these mites still cause damage to citrus. Because the vector exists in Florida, the risk of disease spread remains if the virus is reintroduced in the citrus-producing areas.

Citrus leprosis virus can be transmitted after a short period of feeding (four to seven hours) on an infected plant. It then takes at least two hours

of feeding to transmit the virus to a new host.

The disease is caused by at least seven viruses with remarkably similar biology. This complex of viruses is grouped together by similar plant disease symptoms and includes two types of viruses. One of the two types of citrus leprosis virus replicates in the cytoplasm (C) of the cell, and the virus particles are short and rod-shaped (Figure 1A). The second type replicates in the nucleus (N), and the virus particles are bullet-shaped.

The disease is found in Mexico, Brazil, Columbia, Venezuela, Panama, Costa Rica and other countries in South and Central America (Figure 1B). Citrus leprosis is currently a highly important citrus disease in Brazil and other areas of South America due to the yield loss resulting from infection.

Disease symptoms in fresh fruit abolish their commercial value, and high levels of infection can drastically reduce yield and even cause stem death and complete yield loss. As a result, growers are spending huge amounts of money trying to control the mite population. Citrus leprosis primarily affects sweet oranges, but some grapefruit, mandarin, lime, sour orange, clementine, pummelo, kumquat and sweet lime can also be affected.

Resistant genotypes include varieties of sour orange, Meyer lemon, Royal grapefruit, mandarins, Minneola tangelo and Temple tangors. The

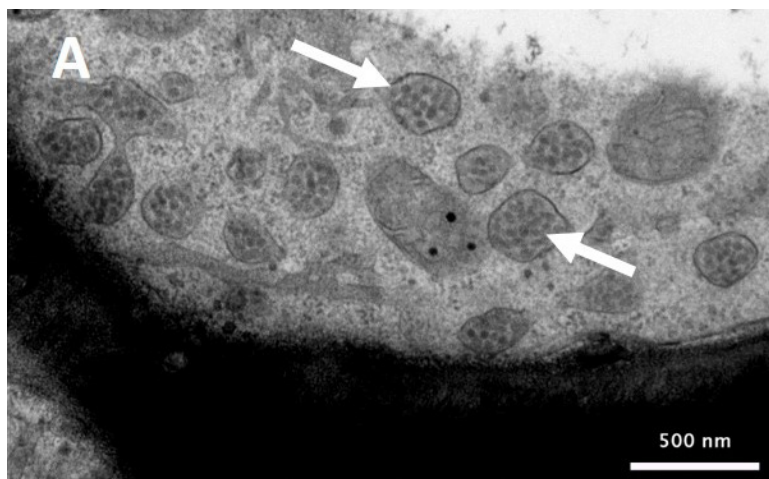


Figure 1A. Transmission electron microscopy shows particles of cytoplasmic type citrus leprosis virus bundles inside Valencia sweet orange in Mexico.

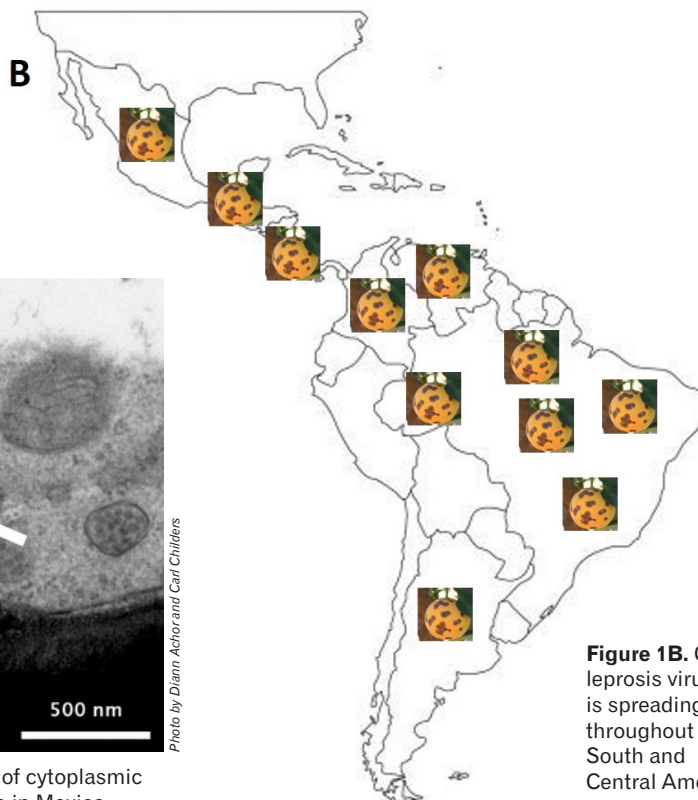
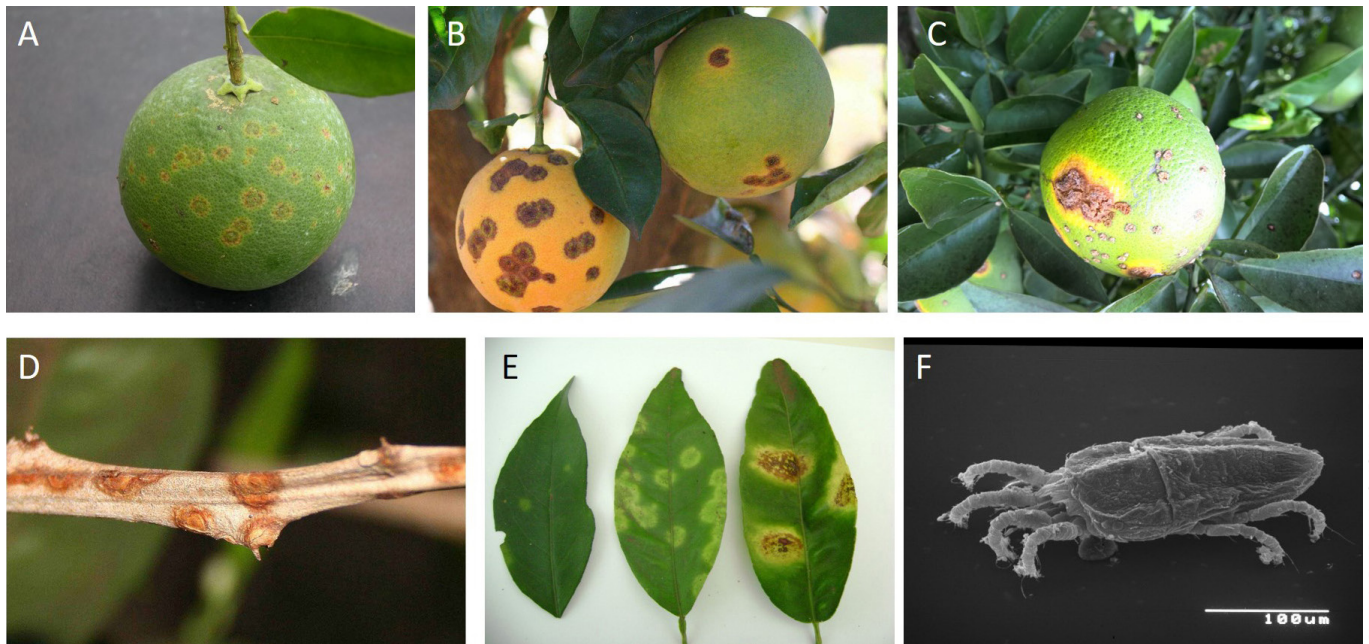


Figure 1B. Citrus leprosis virus is spreading throughout South and Central America.



Photos by Ron Brlansky, Carl Childeers, Evan Johnson and Juliana Astua

Figure 2. Citrus leprosis disease symptoms appear on fruits (A, B), stems (D) and leaves (E). Citrus canker fruit lesions (C), for comparison, have an elevated corky area. Several species of false spider mite (F) are known to transmit citrus leprosis virus.

susceptible and resistant varieties of citrus differ somewhat for the cytoplasmic and nuclear leprosis viruses. No varieties were found that show systemic infection, meaning that symptoms are only found in the leaf, fruit or twig tissue where the mite feeds and the virus is transmitted.

HOW THE LESIONS LOOK

Citrus trees with citrus leprosis have necrotic lesions, often with a yellow halo, on the leaf, bark (stem and trunk) and fruit at the feeding sites of the *Brevipalpus* mites. The fruit lesions are usually chlorotic (pale colored) at first and then may become dead (necrotic) in the center with a distinct yellow halo (Figure 2, A and B). There may be concentric patterns present in the form of rings and gum impregnation in old lesions, giving a brown appearance.

Stem lesions also start as shallow chlorotic concentric rings and may turn darker and coalesce as they increase in size. The lesions become corky over time and produce bark scaling that results in premature fruit drop, leaf abscission and twig die-back when severe (Figure 2, D).

Field symptoms produced by citrus leprosis can be confused by other insect feeding damage.

Leaf lesions are smooth and can vary based on the type of leprosis present (C or N type), but generally start as chlorotic circular spots and then become brown in color (Figure 2, E). As they age, the centers can become necrotic or dead. The leaf lesions correspond on the upper and under sides of the leaves but are more pronounced on the upper sides of the leaves.

Field symptoms produced by citrus leprosis can be confused by other insect feeding damage. Another disease that can be confused with leprosis symptoms is canker. However, canker will usually have an elevated corky area at the center of the lesion, and it may not be circular in shape (Figure 2, C).

FLORIDA FINDINGS

By the 1950s, citrus leprosis was only found in isolated areas of Florida on the east coast and eventually disappeared from the state. It is believed that it was eliminated because of the increased use of miticides, which reduced the population of the *Brevipalpus* mites (Figure 2, F), and an extreme freeze event that took place in 1962.

University of Florida professor Ron Brlansky's work recently identified

a Florida isolate as an N-type virus, which has a unique sequence not currently known to occur worldwide. Additionally, Brlansky's group has identified a virus in Florida hibiscus called hibiscus-infecting cilevirus that shares 92 percent identity with citrus leprosis virus. This similar virus also was identified later in sweet orange samples from Columbia with severe citrus leprosis symptoms.

Altogether, these results indicate a great deal about the epidemiology of citrus leprosis and its potential to reappear in Florida. The objective of this article is to raise grower awareness about this exotic disease before its potential arrival. If the disease arrives in Florida, early detection will be key to managing it. If you suspect leprosis symptoms, contact one of the authors, your local Extension agent or the Florida Department of Agriculture and Consumer Services Division of Plant Industry. 🍊

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